2713
AF/GAU 2615
32/Appeal Brief $
11/29/99

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of	Group Art Unit: 2615
MOTOKI KATO	Examiner: ANAND RAO
Appln. No. 08/634,122	**APPELLANT'S BRIEF**
Filed: April 19, 1996	
For: APPARATUS FOR ENCODING AND DECODING HEADER DATA IN PICTURE SIGNAL TRANSMISSION	2001 Ferry Building San Francisco, CA 94111 (415) 433-4150

Assistant Commissioner for Patents
Washington, D.C. 20231

CERTIFICATE OF MAILING
I hereby certify that this correspondence is being deposited with the United States Postal Service as First Class Mail in an envelope addressed to: Assistant Commissioner for Patents, Washington, DC 20231
on December 2, 1998
LIMBACH & LIMBACH, L.L.P.
Dated: 12/2/98 By:
Name

Sir:

This is an appeal from the decision dated July 7, 1998, of the Examiner twice rejecting claims 1-3, 5-10, and 12-14.

I. Real Party in Interest

Sony Corporation is the assignee and the real party in interest.

II. Related Appeals and Interferences

There are no related other appeals or interferences known to Appellant, the Appellant's legal representative, or Assignee which will directly affect or be directly affected by or have a bearing on the Board's decision in this appeal.

12/09/1998 AIBRAHIM 00000045 08634122
01 FC:120 300.00 OP

III. Status of the Claims

Claims 1-3, 5, 8-10 and 12-14 stand rejected under 35 U.S.C. §103 as being unpatentable over Morrison et al., U.S. Patent No. 4,985,766 (hereinafter Morrison et al.), in view of Raychaudhuri et al., U.S. Patent No. 5,122,875 (hereinafter Raychaudhuri et al.). Claims 6-7 stand rejected under 35 U.S.C. §103 as being unpatentable over Morrison et al. in view of Raychaudhuri et al. and in further view of Fujinami, U.S. Patent No. 5,343,284 (hereinafter Fujinami). These rejections are the subject of this appeal.

IV. Status of Amendments

Applicant has not filed any amendment after the final rejection.

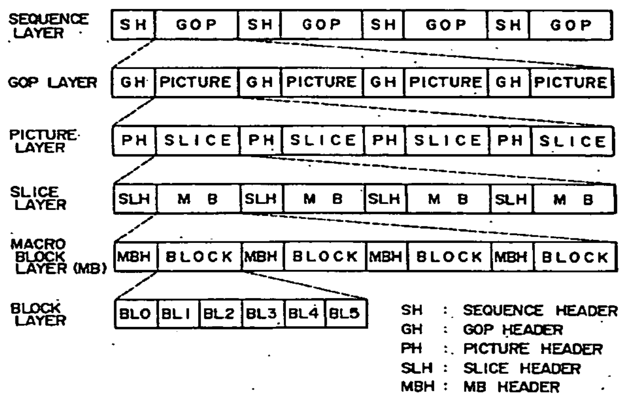
V. Summary of Invention

Applicant's invention teaches a method for encoding a moving picture. More specifically, Applicant's invention teaches a method for decreasing the amount of header data required to encode a moving picture.

As is well known in the art, a moving picture is created by the sequential display of individual pictures. The individual pictures may be encoded as a series of bits on a recording medium such as an optical disc. The series of bits may be subsequently decoded in order to reproduce the moving picture.

One standard for encoding moving pictures is known as MPEG 1. The structure of the MPEG 1 format is shown in Fig. 1 of the subject application, which is reproduced below:

FIG. 1.



According to the MPEG 1 format, a series of bits representing a moving picture is divided into six layers: (1) a sequence layer; (2) a group of pictures (GOP) layer; (3) a picture layer; (4) a slice layer; (5) a macro block layer; and (6) a block layer. These layers are illustrated in Fig. 1.

As also shown in Fig. 1, the layers include header data. Header data is used to provide control information relating to the picture data immediately following the header data. For example, the macro block layer includes header data, illustrated as MBH. This header data applies to the blocks immediately following the MBH. Thus, the first MBH (from the left) applies to the first block, and the second MBH applies to the second block. Header data in the other layers is similarly applied to subsequent data. For example, the first sequence header (SH) applies to the first GOP, and the second sequence header applies to the second GOP.

As explained by the subject patent application, corruption of header data can have a fatal effect on picture reproduction. (Pages 5-6.) As can be seen from Fig. 1, corruption of a single SH effects a plurality of pictures. This, in turn, effects a plurality of slices, and so forth. Accordingly, one object of the invention is to reduce the amount of header data. (Pages 6-7.)

Morrison et al. (a reference relied upon by the Examiner) teach a hierarchical method of reducing the amount of header data. Morrison et al.'s method is implemented in a manner similar to the MPEG 1 format shown

above. Specifically, Morrison et al. teach the use of three types of header data:

(1) a picture header which occurs at the start of a picture;

(2) a group header which proceeds a group of blocks; and

(3) a block header which proceeds a group of picture elements or pels. (Column 4, lines 37-41.)

Morrison et al. then explain that:

> The reason for this arrangement is that it may be possible to reduce the overall quantity of data to be transmitted; for example a single motion vector or quantization strategy may suffice for the whole picture, or a group of blocks; where an entire group of blocks does not require picture information to be transmitted, a single header will suffice. (Column 4, lines 42-48.)

Thus, according to Morrison et al.'s hierarchical structure, a block header, identified as (3) above, will not duplicate information that is contained in the group header, identified as (2) above. Likewise, a group header, identified as (2) above, will not duplicate information that is contained in the picture header, identified as (1) above.

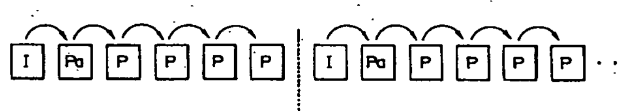
Applicant's invention teaches a method that further eliminates duplicate information between header data *of the same level*. An example will help to illustrate the benefits of applicant's invention.

As mentioned above, a sequence header (illustrated as SH in Fig. 1 above) applies to a plurality of pictures. If all of the pictures within a group of pictures make use of the same control information, then that control information can be provided by the higher-level sequence header. This reduces the amount of header data. However, where pictures within a group of pictures require different control information, then that control information

cannot be provided by the higher-level sequence header. Instead, that control information must be provided by the individual picture headers. This increases the amount of header data.

Applicant's invention teaches that this increase may be reduced where a plurality of sequential picture headers make use of the same control information. Unlike the prior art relied upon by the Examiner, this may be achieved even where some of the pictures within a group require different control information. This reduction will be discussed with reference to Fig. 5 of the subject application, which is reproduced on the following page:

FIG. 5



I : I PICTURE
P : P PICTURE

ARROWS INDICATE EXAMPLE OF PREDICTIVE COMPENSATION

As delineated by the dashed line, the first six pictures from the left comprise a group of pictures (GOP). One of these is an intra-frame encoded (or "I") picture and the following five are predictive encoded (or "P") pictures. Since I pictures require control information different than that of P pictures, the higher-level sequence header cannot be used to encode all of these six pictures. Accordingly, the I picture provides the necessary control information in a header associated with that I picture. Likewise, the first P picture, Pa, provides the necessary control information in a header associated with that P picture. Applicant's invention teaches that the subsequent P pictures can use the control information provided by Pa. Accordingly, the amount of header data required for the subsequent P pictures is reduced.

Furthermore, this reduction in header data, as illustrated in Fig. 5, occurs across picture boundaries. In other words, header data associated with a first picture (at a first point in time) can be used to encode a second picture (at a second point in time).

VI. Issues

Whether extending the teachings of Morrison et al. in view of Raychaudhuri et al. establishes a *prima facie* case of obviousness for Applicant's invention as recited by claims 1-3, 5, 8-10 and 12-14.

Whether extending the teachings of Morrison et al. in view of Raychaudhuri et al. in further view of Fujinami establishes a *prima facie* case of obviousness for Applicant's invention as recited by claims 6-7.

VII. Grouping of the Claims

Claims 1 and 2 recite a picture encoding apparatus that compares the control data of one picture with control data of another picture. Morrison et al., the reference relied upon by the Examiner for this element, teach that comparisons between control data occur only within one picture. Accordingly, claims 1 and 2 stand together.

Claims 3, 5, 10 and 12 recite decoding a second (or succeeding) picture based upon control information associated with a first picture. Morrison et al., the reference relied upon by the Examiner for this element, teaches decoding a picture based only upon control information associated with that picture. Claims 6, 7, 13 and 14 recite encoding complementary to the decoding recited in claims 3, 5, 10 and 12. Accordingly, claims 3, 5-7, 10 and 12-14 stand together.

Claims 8 and 9 recite a picture encoding method that compares the control data of a first picture with control data of a second picture. In addition, these claims recite that the control data of the second picture is not encoded unless the control data of the second picture is different than the

control data of the first picture. Again, Morrison et al., the reference relied upon by the Examiner for these elements, teach that comparisons between control data occur within one picture. In addition, Morrison et al. teach the inclusion of control data with every picture. Accordingly, claims 8 and 9 stand together.

VIII. Argument

A. Examiner's Rationale

The Examiner contends that Morrison et al. teach "a series of multiple picture headers for respective multiple pictures..." (Paper 25, page 3.) The Examiner also asserts that Morrison et al. teach that picture headers may be applied to multiple pictures. (Id.) However, the Examiner admits that Morrison et al. does not teach the use of such encoding in an MPEG environment. (Paper 22, page 3; reasserted in paper 25, page 2.) Nonetheless, the Examiner asserts that the teachings of Morrison et al. can be extended to the MPEG environment taught by Raychaudhuri et al. (Paper 22, page 4; reasserted in paper 25, page 2.) Based upon this combination, the Examiner contends that claims 1-3, 5, 8-10 and 12-14 are obvious. (Paper 25, page 2.)

Further, the Examiner admits that neither Morrison et al. nor Raychaudhuri et al. teach recording encoded picture data on a recording medium. (Paper 22, page 5.) However, Fujinami teaches recording encoded picture data. Based upon this combination, the Examiner contends that claims 6 and 7 are obvious. (Id.)

The rejection of claims 6 and 7 was made in the non-final Office Action dated June 30, 1997. (Id.) Applicant's traversed this rejection in a response dated November 3, 1997. The Examiner then issued a final Office Action dated March 30, 1998, but completely omitted any reference to claims 6 and 7. Applicant brought this omission to the Examiner's attention in a

response after final dated June 4, 1998, which supported the patentability of claims 6 and 7. However, the Examiner merely issued an Advisory Action listing claims 6 and 7 as rejected without providing any further support.

The Examiner's actions should be complete as to all matters at issue. 37 CFR §1.105. Although applicant objects to the Examiner's failure to address completely claims 6 and 7, applicant has not appealed this failure in order to expedite the prosecution of these claims. Moreover, since these claims have been twice rejected (once in the Office Action dated June 30, 1997, and once in the Advisory Action dated July 7, 1998) review of these rejections is sought pursuant to 37 CFR §1.191(a).

B. <u>Summary of the Argument</u>

The Examiner's assertion that Morrison et al. teach picture headers that may be applied to multiple pictures is unsupported. In fact, Morrison et al.'s encoding and decoding apparatus teach that a picture header applies to one and only one picture. Applicant's claimed invention uses a first picture header to encode a second picture. Since the use of header data within a picture does not teach or suggest the use of header data across a picture boundary, Morrison et al. in view of Raychaudhuri et al. fail to establish a *prima facie* case of obviousness.

Even accepting the Examiner's extension of Morrison et al. *arguendo*, Morrison et al. consistently teach a hierarchical header structure. Accordingly, the Examiner's extension of Morrison et al. across a picture boundary would merely provide a header structure similar to the MPEG 1 structure shown above in Fig. 1. In fact, the Examiner admits exactly this point stating "compression according to MPEG would reasonably inferred (sic) [by Morrison et al.]" (Paper 22, pages 3.)

As explained above, MPEG 1 also teaches a hierarchical structure where a single sequence header applies to all of the pictures within a group. Where pictures within a group require different types of control information,

a single sequence header cannot be used to encode all of the pictures within the group. However, Applicant's invention teaches that reductions in the amount of header data are still possible. Specifically, applicant's invention exploits redundancies across peer-level picture headers to reduce the amount of header data. Accordingly, the Examiner's extension of Morrison et al. likewise fails to establish a *prima facie* case of obviousness.

C. Legal Standard of an Obviousness Rejection

The Examiner bears the burden of establishing a *prima facia* case of obviousness. In re Deuel, 34 USPQ 2d 1210, 1214 (Fed. Cir. 1995). To establish a *prima facia* case of obviousness, the Examiner must provide references which in combination teach the claimed invention. In re Fine, 837 F.2d 1071, 1074, 5 USPQ 2d 1596, 1598 (Fed. Cir. 1988). When the references cited by the Examiner fail to establish a *prima facia* case of obviousness, the rejection is improper and will be overturned. In re Deuel, 34 USPQ at 1214. When the Examiner is unable to make a *prima facia* case of unpatentablility, the applicant is entitled to a grant of a patent. In re Oetiker, 24 USPQ 2d 1443, 1444 (Fed. Cir. 1992).

D. The Prior Art Relied upon by the Examiner Teaches Away from Applicant's Invention as Recited by Claims 1 and 2

The Examiner rejected claims 1 and 2 under 35 U.S.C. §103 over Morrison et al. in view of Raychaudhuri et al. Specifically, the Examiner contends that Morrison et al. teach a "comparator means for comparing the first control data with a second control data included in the next header data of another picture." (Paper 22, page 3, citing Morrison et al. column 5, lines 10-25, reasserted in paper 25, page 2.)

As explained above, applicant's invention teaches that reductions in the amount of header data may be obtained by comparing control data in a first picture header with control data in a second picture header. Where the

control data in the second picture header matches that in the first picture header, it may be omitted. To achieve such reductions, applicant's invention teaches that the control data of a second picture header must be compared to the control data of a first picture header. Claims 1 and 2 specifically recite "comparing the first control data with second control data included in a next header of another picture..."

Unlike applicant's invention, Morrison et al. specifically teach that a picture header is provided with each picture. In fact, only seven lines above the portion of Morrison et al. relied upon by the Examiner to teach a comparator means, Morrison et al. explain that "at the start of *each* picture the unit 27 [a part of the encoder] receives a 'picture' header sequence." (Column 5, lines 3-4, emphasis supplied.)

Morrison et al. do teach reductions in header data, however, these reductions occur only within a picture. As explained above, Morrison et al. teach a hierarchical header structure that includes:

(1) a picture header which occurs at the start of a picture;
(2) a group header which proceeds a group of blocks; and
(3) a block header which proceeds a group of picture elements or pels.
(Column 4, lines 37-41.)

A group header and a block header are used within a picture where a portion of the picture has the same or similar qualities. The portion of Morrison et al. relied upon by the Examiner merely explains that where a group header would duplicate information contained in a picture header, then that information is omitted. Likewise, where a block header would duplicate information contained in a group header, then that information is omitted. (Column 5, lines 11-23.) This reduces header data, however, all such reductions occur within a single picture. Importantly, Morrison et al. do not

exploit header redundancies that may occur across the temporal boundaries of different pictures.

Unlike Morrison et al., applicant's invention teaches that additional reductions in header data may be achieved by comparing header data of a first picture with that of a second picture. Claims 1 and 2 recite this distinction over the reference relied upon by the Examiner. Since Morrison et al. teach the reduction of header data by comparisons that occur within a picture boundary, Morrison et al. teach away from comparisons that cross a picture boundary.

Nonetheless, the Examiner further contends that the teachings of Morrison et al. can be extended across a picture boundary. As stated in the Office Action finally rejecting the claims at issue:

> [T]he Examiner asserts that this would extend all the way up to the picture header level since Morrison discloses that the picture level can also be used to house particular parameters to represent the change or lack of changes in the video signal on the whole picture level, as well. (Paper 25, page 3, internal citations omitted.)

The Examiner's assertion contradicts the manifest teachings of Morrison et al. A *prima facia* case of obviousness requires that the prior art references teach or suggest every element of the subject claim. As the Federal Circuit has explained, where a reference leads one of ordinary skill in the art "in a direction divergent from the path that was taken by the applicant" then that reference teaches away from applicant's invention. In re Gurley, 31 USPQ 2d 1130, 1131 (1994).

The contradiction resulting from the Examiner's extension of Morrison et al. can be seen with reference to the preferred decoder taught by this reference. (Column 7, line 63 - column 9, line 31.) This decoder scans an

incoming data stream for a picture start code indicating the start of a new picture. (Column 7, lines 63-65.) Upon receiving a picture start code, the decoder *resets* to a base memory address. (Column 8, lines 10-14.) From the base memory address, the decoder operates to translate the incoming data stream into a picture signal. Specifically, the decoder passes the incoming data through buffer 47, which acts as a rate convertor, to a demultiplexor 49. (Column 8, lines 39-49; column 8, lines 56-58.) The demultiplexor 49 writes header data to an overhead fifo 490, and coefficient data to a coefficient fifo 491. The demultiplexor 49 uses these to produce a picture signal.

Two aspects of Morrison et al.'s decoder teach away from the Examiner's extension of this reference. First, Morrison et al.'s decoder is *reset* to a base address of memory upon receipt of a picture start code. (Column 8, lines 10-14.) This suggests that any state information associated with a previous picture is lost upon the start of a new picture and that each picture is treated as a separate unit. Since Morrison et al. treat each picture as a separate unit, Morrison et al. teach away from comparing picture headers across a picture boundary.

Second, the decoder of Morrison et al. stops reading data from the buffer 47 for the current picture upon detection of a new picture start code. (Column 8, lines 62-66.) This likewise suggests that each picture is treated as a separate unit and teaches away from comparing picture headers across a picture boundary.

Again, applicant's invention teaches that the comparison of picture header data across a picture boundary can reduce data requirements. Since Morrison et al. teach that any compression in control information occurs within a single picture, Morrison et al. teach away from applicant's claimed invention. In addition, the Examiner's asserted extension of Morrison et al. contradicts the manifest teachings of this reference and does not establish a *prima facie* case of obviousness. Accordingly, claims 1 and 2 stand patentable over the prior art relied upon by the Examiner.

E. The Prior Art Relied upon by the Examiner Teaches Away from Applicant's Invention as Recited by Claims 3, 5-7, 10 and 12-14

The Examiner rejected claims 3, 5, 10 and 12 under 35 U.S.C. §103 over Morrison et al. in view of Raychaudhuri et al. Each of these claims recite decoding a second (or succeeding) picture based upon control information associated with a first picture. Morrison et al. teach decoding a picture based only upon control information associated with that picture.

As discussed above, Morrison et al. specifically teach a decoder that is *reset* to a base address of memory upon receipt of a picture start code. (Column 8, lines 10-14.) This teaches that any state information associated with a previous picture is lost upon the start of a new picture and that each picture is treated as a separate unit. Since Morrison et al. treat each picture as a separate unit, Morrison et al. teach away from decoding a second (or succeeding) picture based upon control information associated with a first picture.

In addition, Morrison et al. specifically teach that a decoder stops reading data from the buffer 47 for the current picture upon detection of a new picture start code. (Column 8, lines 62-66.) This likewise suggests that each picture is treated as a separate unit and teaches away from decoding a second (or succeeding) picture based upon control information associated with a first picture.

Claims 6, 7, 13 and 14 recite encoding complementary to the decoding recited in claims 3, 5, 10 and 12. As set forth above, applicant's invention teaches that an encoder can reduce the amount of header data by comparing a first picture header with a second picture header. When this comparison generates a match, the second picture header may be omitted.

Again, Morrison et al. teach that each picture includes a picture header. Specifically, Morrison et al. explain that "at the start of each picture the unit 27 [a part of the encoder] receives a picture header sequence."

(Column 5, lines 3-4.) Unlike the Morrison et al., applicant's invention does not receive a picture header sequence at the start of each picture. In fact, applicant's invention omits picture headers.

Since Morrison et al. teach the inclusion of a picture header for each picture, Morrison et al. teach away from applicant's invention which omits picture headers when the picture header matches that of the previous picture. Accordingly, the Examiner has failed to establish a *prima facie* case of obviousness. In re Gurley 31 USPQ 2d at 1131.

F. **The Prior Art Relied upon by the Examiner Teaches Away from Applicant's Invention as Recited by Claims 8 and 9**

The Examiner rejected claims 8 and 9 under 35 U.S.C. §103 over Morrison et al. in view of Raychaudhuri et al. Claims 8 and 9 each recite a picture encoding method that compares the control data of a first picture with control data of a second picture. For the reasons set forth above with regard to claims 1 and 2, the Examiner has failed to provide a reference that teaches or suggests the same. In addition, claims 8 and 9 each recite that the control data of a second picture is not encoded unless the control data of the second picture is different than the control data of the first picture. For the reasons set forth above with regard to claims 3, 5-7, 10 and 12-14 the Examiner has failed to provide a reference that teaches or suggests the same.

Accordingly, the Examiner has failed to establish a *prima facie* case of obviousness on both of these grounds.

IX. CONCLUSION

For the reasons set forth above, claims 1-3, 5-10 and 12-14 stand in allowable form. The Board of Appeals is requested to reverse the Examiner's rejections.

Respectfully submitted,

LIMBACH & LIMBACH L.L.P.

Dated: 12/2/98

By: [signature]

Heath W. Hoglund
Reg. No. 41,076

Attorneys for Applicants

Atty. Docket No. SONY-C4021

APPENDIX A

Claims on Appeal

1. A picture encoding apparatus for forming an encoded P picture signal, comprising:

memory means for storing first control data included in header data of a P picture to control a P picture encoding condition;

comparator means for comparing the first control data with second control data included in a next header data of another picture; and

means for changing the P picture encoding condition and for encoding an input signal to a P picture according to an output signal of said comparator means, when the first control data and the second control data are different from each other.

2. The picture encoding apparatus according to claim 1, wherein a group of pictures layer includes said P picture.

3. A picture decoding apparatus for decoding an encoded P picture signal, comprising:

memory means for storing control data included in header data of a P picture; and

decoding means for decoding a succeeding encoded P picture signal by using, when a next header data of said succeeding encoded P picture does not contain control data, the control data stored in said memory means.

5. The picture decoding apparatus according to claim 3, wherein a group of pictures layer includes said P picture.

6. A picture recording medium having an encoded P picture signal, comprising:

a first encoded P picture signal of a predetermined layer including control data; and

a second encoded P picture signal following said first encoded picture signal, wherein said second encoded P picture signal omits the control data.

7. The picture recording medium according to claim 6, wherein a group of pictures layer includes said P picture.

8. A picture encoding method for forming an encoded P picture signal, comprising the steps of:

comparing first control data, which is included in header data of a P picture, with second control data included in a next header data of another picture; and

encoding the remarks second control data only when the first control data and the second control data are different from each other.

9. The picture encoding method according to claim 8, wherein a group of pictures layer includes said P picture.

10. A picture decoding method for decoding an encoded P picture signal, comprising the steps of:

storing a first control data included in header data of a P picture; and

decoding a succeeding encoded P picture signal by using the stored first control data when a control data does not exist in a next header data of said succeeding encoded P picture.

12. The picture decoding method according to claim 10, wherein a group of pictures layer includes said P picture.

13. A picture signal transmission method for transmitting encoded P picture data, comprising the steps of:

transmitting a first encoded P picture signal and control data thereof; and

transmitting a second encoded P picture signal and including none of a control data of the second encoded picture signal when control data of the first encoded P picture signal is the same as the control data of the second encoded P picture signal.

14. The picture signal transmission method according to claim 13, wherein a group of pictures layer includes a P picture.